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CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

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COUNTRY Switzerland

REPORT NO. [redacted]

SUBJECT Research Data on D-Lysergic Acid Diethylamide (LSD-25)/ Potential for BW and CW

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SUPP TO

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a. LSD-25 is normally a nontoxic material which is very potent, about one hundred times stronger than mescaline and gives similar physiological and psychic reactions.

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b. LSD-25 has the potential of being an aid in the treatment of mental patients.

c. LSD-25, if improperly used is a dangerous material -- it creates serious mental confusion and makes the human mind temporarily susceptible to suggestions. No research has been done to determine what permanent damage could be done to the human mind if the material was administered over extended periods.

d. LSD-25 could be used in the interrogations of unwilling subjects for the purpose of getting them to "confess" as the material stimulates subjects to talk more freely.

e. LSD-25, because of its potency, could possibly be used in the contamination of food and water for the purpose of rendering whole groups of people (including troops) mentally indifferent to their surroundings and situation.

5. Our investigations thus far substantiate the findings of other investigators but we have carried our research on animals much further than others working on LSD-25. We can take no serious exception to the printed material furnished us by Sandoz Ltd which gives a summary of extensive research on LSD-25 as of November 1952 and is quoted below:

6. "D-LYSERGIC ACID DIETHYLAMIDE (LSD-25)

"CHEMICAL CONSTITUTION:

D-lysergic acid diethylamide is a partially synthetic derivative obtained by condensing D-lysergic acid, extracted from ergot of rye, with a secondary amine, diethylamine. Thus LSD-25, first prepared in 1938 by A Stoll and A Hofmann [1], /see notes at end of report/ belongs to the ergonovine group. LSD-25 is soluble in distilled water, a process facilitated by adding crystalline tartaric acid (four parts of tartaric acid to one of LSD).

7. "EFFECTS OF LSD ON ANIMALS:

In certain respects LSD resembles ergonovine. It exerts a uterotonic action (the uterotonic effect of LSD on the rabbit uterus in situ is 7/10 of that of ergonovine). LSD exerts no adrenosympathicolytic action (a contrast to the alkaloids of the ergotamine and ergotoxine groups) and its toxicity is similar to that of ergonovine and ergotamine (the LD 50 in mice of intravenous LSD-25 is 65 mg/Kg, of intravenous ergotamine 84 mg/Kg and of intravenous ergonovine 125 mg/Kg.)

However, LSD-25 may be clearly distinguished from all the other ergot alkaloids so far investigated in other respects. The injection of a small dose of LSD-25 into the anaesthetized rabbit produces motor excitation. In the dog the first apparent effects of LSD-25 are of a vegetative nature, e g copious

salivation, without any significant change in affective behavior. High doses of LSD-25, like bulbocapnine, cause motor rigidity in the dog and cat, a condition reminiscent of catatonic states.

On the normal mouse, LSD has a weak excitatory action which appears only at a subtoxic dosage level. Mice with hereditary waltzing anomaly are more sensitive to this drug. Subcutaneous doses of no more than three percent of the LD 50 increase the general excitatory state, but with simultaneous suppression of waltzing movements (ROTHLIN, CERLETTI 25).

DELAY et al[15] studied the effect of LSD on the electrocorticogram of the rabbit. Doses of 40 mg/Kg (average) injected intravenously or into the carotid artery caused marked or even complete flattening of the tracing. The effect was progressive, setting in after approximately one minute and lasting one - two hours. The effect was clear-cut even after doses as small as 18-20 mg/Kg. An identical effect was noted after massive doses (300-600 mg/Kg). There was simultaneous marked motor hyperexcitability.

LSD inhibited the spontaneous rhythmic activity; it did not prevent the response to electrical stimulation, the epileptic spikes, the bursts of rapid spikes produced by barbiturates or cortical trauma. Of the vasodilator substances investigated, nicotinic acid, dibenamine, hexamethonium, priscol and alcohol did not modify the effect of LSD. Acetylcholine, given intravenously, in doses of 20-40 mg/Kg, caused the reappearance of bursts of basal rhythm. Urethane and chloralose did not modify the effect of LSD.

8. "EFFECTS OF LSD ON HUMAN BEINGS:

The above mentioned animal experiments do not give any hint whatsoever as to the mental effects exerted by LSD in human beings. Hofmann discovered these effects by accident and then carried out investigations on himself which were reported by W Stoll[2]. Studies on the effects of LSD 25 in normal subjects have been carried out by W Stoll[2], Condrau[5], Becker[6], Georgi et al[8], Rinkel et al[10], Matkfi[11], Mayer-Gross[17], Weil[16] and other research workers, whose reports have not yet been published.

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The effects of LSD have been investigated in psychotic patients by Stoll[2], De Giacono[3], Forrer[4] and Goldner[5], Condrau[7], Busch and Johnson[19], Hoch et al[24], Savage[27], and Belsanti[9]. Kostafinski has made some experiments with LSD in epileptic patients.

As far as systemic effects are concerned, both normal and psychopathic subjects respond in almost the same manner to LSD and may, therefore, be considered as one group. However, this is not the case with the mental effects, and therefore normal and psychopathic patients have to be considered separately in this respect.

a. Active and maximum doses: Up to the present, LSD has always been administered orally, generally in the morning on an empty stomach. LSD is active in very small doses. In certain subjects the characteristic effects are observed after the administration of a dose as small as 20 γg (microgram = 0.02 mg). A dose of 40-100 γg (about 1 γg/Kg body weight) is active in most cases. Doses as high as 500 γg (= 0.5 mg) or 6 γg/Kg body weight have been well tolerated by psychopathic patients[3,4].

In general psychopathic patients show greater resistance to the systemic and mental effects of LSD than do normal subjects.

b. Onset and duration of action: The first effects of an active dose of LSD generally appear within one-half - one hour (maximum three hours). Maximum effectiveness is reached, on an average, after two hours and the effects persist for three - six hours. Delayed effects may be observed for one or more days but rarely for more than one week. Rinkel et al[13] recognize four phases in the reaction to LSD. Phase I, the prodromal phase, represents the period between the administration of the drug and the height of the reaction. It lasts about one hour. Phase II represents the height of the reaction, occurring one-five hours after the drug had been given. Phase III was the period from the end of the height of the reaction until evening. Phase IV comprised after-effects lasting one to several days.

c. Systemic effects: Distinction may be drawn between vegetative symptoms, fairly slight effects on metabolism and motor symptoms.

Vegetative symptoms:
Giddiness [2,5,7], "empty-headedness" [5,10], occasionally headaches [2,5,7]. In isolated cases general malaise [2,5,6], feeling of weakness [5,10], fatigue [5], tremor and shaking [10].

Effects of LSD on:

(1) Cardiovascular system:

Blood pressure: Slightly increased, within physiological limits [4,8,11], or not modified [10]; less frequently slightly decreased [2,5]. In exceptional cases danger of collapse [5]. Two patients given LSD daily developed profound circulatory depression [24].

Heart rate: increased [4,7,8,11] or not modified [10]. In isolated cases decreased [2,3,5].

Vasomotor functions: flushes of vasodilatation [2,4,5,7,10] or facial pallor, sometimes acrocyanosis [5].

Subjective impressions: sometimes palpitations [2,5] or precordial discomfort [5].

(2) Digestive system:

Anorexia, sometimes nausea [2,4,5,6,7,10,19] occasionally vomiting [4,5,7,19], and in isolated cases lyocrexia [5].

(3) Hepatic function:

Only very slight changes observed. Whereas the usual laboratory tests such as the Takata-Ara and the Hijmans v d Borg reactions, the Quick test (excretion of hippuric acid following ingestion of sodium benzoate) or the caphalin-cholesterol flocculation test show no change [3,4,8,27], the Snapper test (determination of glucuronic acid in the urine after administration of cinnamic acid) reveals slight, temporary disturbance of hepatic function [8,27]. It should be noted that the Quick test and the Snapper test are positive in schizophrenia and mescaline intoxication [8]. Subjects in whom even only a slight modification of hepatic function is present (e g cases where there are protracted sequelae of infectious hepatitis) make a very marked response to LSD [8].

(4) Respiration:

Usually not changed [2,3,4,5] ; respiration sometimes deep and slower [2,3,5].

(5) Urinary system:

No changes in composition of urine [4,5]. Diuresis sometimes increased [2]. In isolated cases retention of urine followed by polyuria when the effects of LSD had worn off [6].

(6) Genital system:

In isolated cases uterine cramps [10].

(7) Temperature:

No change, in exceptional cases increased by 1°F [4]. Feeling of warmth [2,5,6,19] or cold [2,5,6,7,11], sometimes periods of shivering [10,19].

(8) Saliva secretion:

Often increased [4,5,6,8,10].

(9) Sweat secretion:

Often increased [2,5,6,8,10]

(10) Lacrimal secretion:

Sometimes increased [4].

(11) Pupils:

Generally dilatation [2,4,7,8,10,11,19], sometimes impairment of reaction to light [4]; mydriasis less pronounced when LSD instilled into the conjunctival sac [4].

(12) Blood picture:

Temporary increase in total white blood cell count without modifications in the differential count or relative neutrophilia [27].

Slight increase in potassium blood values, no change in calcium blood values [3,27]. Savage [24] observed some tendency for anaemia to appear during prolonged treatment (20-100 ug daily for one month).

(13) Blood sugar:

Slight rise, within physiological limits [4]; less frequently a fall [3]. In 24 subjects Mayer-Gross et al [17,21] found that LSD caused a slight,

transitory increase in the glucose and hexosemenophosphate levels in the blood. Otherwise carbohydrate metabolism was not affected. This group of investigators believe that by an anti-enzyme action, LSD interrupts the break down of glycogen at the hexosemenophosphate state. The intravenous injection of 33% glucose solution modified the reaction to LSD [21].

Aggregate of vegetative effects:

LSD tends to produce amphotonia. The increase in blood pressure and heart rate and the dilatation of the pupils suggest an increase in sympathetic tenus. The nausea and the periods of vasodilation suggest parasympathetic hyperactivity.

However, it should be noted that there are great differences from individual to individual. Some subjects respond to LSD with a fall in blood pressure, bradycardia and other symptoms suggestive of sympathetic inhibition [3,13].

In general, LSD produces vegetative instability [13] which may tend either to sympathicotonia or to vagotonia, depending on the individual subject.

Motor symptoms:

LSD causes disturbances of voluntary motor functions (which are generally slight) and also modifications of reflexes.

Ataxia: generally not pronounced, lack of precision in intentional movements, slight degree of incoordination, occasionally unsteadiness of gait [2,4,5,6,8,11]. Occasionally faulty speech articulation [2,5,8,10].

Romberg's sign: sometimes slightly positive [2,5,27]. Sometimes tremor of the hand and twitching of the eyelids [5,7,8,27]. Often facial clonism, cramps of the jaws, trismus and forced laughter [2,5,6,7,8,10]. Sometimes hyperactivity of tendon reflexes [2,4,5]. Sometimes motor excitement [3,5,7,10], in exceptional cases athetoxic movements [5]. In certain cases high doses (300-500 mg) produce catatonic conditions with a lack of facial expression and perservation of body posture [3].

Aggregate of motor symptoms:

The most frequent motor effect of LSD may be described as a slight degree of muscular hyperexcitability accompanied by more or less pronounced signs of incoordination. The catatonic effect of high doses has, as yet, only been studied

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in five cases.

d. Mental effects in normal subjects:

Consciousness, orientation: Consciousness is generally maintained but occasionally slightly clouded [2,6,14]; a feeling of intoxication [5], often occurring in a wave pattern of outbursts [6]. In exceptional cases short periods of confusion [2].

As a rule, judgment and memory are not impaired. The subject is conscious of his condition and does not lose sight of the fact that what he is experiencing is due to the drug ingested [2,5,6,8,10,11]. Certain subjects notice that their powers of self-observation and introspection are increased [6].

Spatial orientation remains good. The notion of duration of time is often disturbed, time seeming to pass too quickly or too slowly [2,5,6,8,10,11].

Ideation: may be accelerated, accompanied sometimes by incoherence, and "running away" of ideas [2,5,10]; in other cases ideation is slowed down and the faculty of expression inhibited [2,8,10]. Often a tendency to preoccupation with one idea [2,5]. Attention and concentration are reduced [2,5,6,8,11].

Affectivity and behavior: Several types of reactions may be observed:

(1) Marked euphoria made evident by disordered activity, manic behavior, more or less unmotivated attack of laughter, or even involuntary maniacal laughter [2,5,6,10,14,17]. Less frequently the euphoria is passive, apathic and hebephrenic [8,10,11].

(2) Depression which may be demonstrative with tears, resentment, aggressiveness [2,6,10,14] or passive with negative withdrawal into the self, autism, apathy and even complete indifference [2,6,10], sometimes suicidal ideas [2,6].

(3) Alternate phases of euphoria and depression [2,5,17].

In addition to these effects, there is sometimes associated anxiety [24], paranoid trends [13], or the fear that the abnormal state will persist or will be noted by a third party [2,5,6].

In general, under the effect of LSD an enhancement of the previous affective state whether constitutional or temporary may be observed [5,6]. The euphoric reaction seems, however, most frequent [2,8,10].

Behavior is controlled by affectivity. In cases of hypomanic euphoria, the disordered activity is often accompanied by logorrhœa and loss of inhibition; the subject cannot prevent himself from saying what he thinks [2,5,6] and seeks affective contacts. On the other hand, in cases of depressive schizoid reaction often all affective contact is suppressed and the apathy may even develop into a state of stupor [6,10].

Sedative effects on sexuality [2].

Sensory perceptions: Disturbances of perception are frequent and sometimes very pronounced. Either the object perceived is distorted or there are hallucinations generally of an elementary nature.

Vision: Often the objects appear distorted, perspective is incorrect, distances are overestimated, colors seem brighter, shadows very intense and contours very clear-cut [2,5,6,8,11,14]. Less frequently the outline of the object seen is less distinct and colors are dull [6].

Certain subjects experience hallucinations especially if they are in the dark and their eyes are closed. These hallucinations generally consist of flashes of light, lines, patches of color, sometimes more complex geometrical figures, objects, flowers and animals [2,5,8,10,11]. In exceptional cases the visual hallucinations are provoked by auditory stimuli [2].

Hearing: Often hyperacusia and false interpretation of noises [2,5,6,8,10,11,19]. Less frequently true auditory hallucinations, e g sound of a bell [6,10].

Taste and smell: Taste is often affected. Food and cigarettes seem tasteless. Sometimes metallic or bitter taste [2,5,6,8,10]. In rare cases olfactory hallucinations, e g garlic odor [11].

Touch: Frequently distortion, hypoesthesia and paresthesia: things feel different [2,6]. In isolated cases true tactile hallucinations, e g sensation of being wet from urine [10].

General bodily feelings: Feeling of strangeness or distortion of certain parts of the body [2,5,6,8,10,14]: the subject has the impression that his head is enormous, that one limb is excessively long or seperated from the body, that his nose is not in its right place, that his arm "no longer belongs to him" or that his body weight has decreased or increased.

Personality: In certain subjects LSD produces a feeling of depersonalization or of split personality of a clearly schizophrenic nature [2,5,6,10]. Impression of looking at one's self from a distance, of having lost control of one's real self, of having changed and become more or less unreal and cut off from the rest of the world. These phenomena are generally associated with the cenesthetic disorders as well as with autism, withdrawal and indifference. These personality disorders are less frequent in subjects who make a manic euphoric or depressive response to LSD.

Psychological tests: Rinkel [10,13] carried out Rorschach's test on five subjects under the influence of LSD. The results of the test confirmed the clinical observations of the effect of LSD in each of the five individuals: autism, negativism, weakening of powers of logical reasoning, anxiety, depression, and aggressiveness. Another test ("concrete-abstract thinking") consisting of noting the reactions of the subjects to a series of aphorisms also gave responses reminiscent of those of schizophrenic patients, (predominance of concrete responses; abstract responses could be obtained with effort but were characterized by overgeneralized and tangential thinking).

Rimmel did not employ these tests in persons who made a manic depressive response to LSD. In an alcoholic, a Rorschach's test carried out just after the subsidence of the LSD effects showed profound changes over the previous tests [26].

Matkfi [11] studied the effects of LSD on himself. He made a series of drawings supposed to represent the same person (Zeichentest') while under the influence of LSD and found that his strokes became quicker, sometimes stereotyped, the drawing became larger, and even went off the paper. In spite of all his efforts, he could not coordinate his drawing with what he saw, whether it was normal or not. When the height of the LSD effect was reached, he made a drawing of his visual hallucinations.

Electroencephalogram: EEG tracings have been taken, as yet, in only about 15 cases. There have been slight [10,13] or no changes [4]. Rinkel [10,13] found, in general, an increase in alpha rhythm of one-three waves per second, but in one very relaxed subject the alpha rhythm was slowed by two waves per second. In eight cases out of nine he noted a pronounced increase in muscle activity.

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Delayed Effects: The 'intoxication' of LSD generally wears off within six-eight hours, but in practically every case a more or less unusual mental status persists for one-half to one day and sometimes for more than one week.

In the evening after the experiment, euphoria, logorrhoea, difficulty of concentration and sometimes great fatigue are noted. The subjects generally sleep well, but the following morning certain of them complain of a "hangover," similar to that produced by excessive amounts of alcohol. However, by this time most subjects have returned to their normal status[2]. Sometimes the euphoria lasts several days[6].

Less frequently a depressive state is observed[2]. This may last several days[6,8]. One subject exhibited periods of dreaminess (with feelings of strangeness, of "deja vu" and disturbed general bodily feelings), alternating with phases of depression[6], after a single dose of LSD. These delayed effects often occurred in waves[13].

Aggregate of psychic effects in normal subjects: The symptoms produced by LSD have been considered by W Stoll[2] as the expression of an acute exogenic psychosis, analogous to those produced by alcohol, opium, cocaine, hashish, mescaline and the amphetamines (however, all these substances are only active in far higher doses[23]).

There is no uniform reaction to LSD. Two main types may be distinguished[6,10]:

(1) manic, expansive reaction with psychomotor excitement, euphoria and less frequently depression,

(2) a schizophrenic reaction with slowing of mental processes, inhibitions, autism, depersonalization and hallucinations.

The majority of subjects present a mixture of these two extreme types. Becker[6] attributes the manic response to the action of LSD on the sphere of intention and the schizophrenic reaction to the action of LSD on the sphere of affect.

In general, LSD tends to reinforce pre-existing tendencies, producing a caricature of the subject[5]: the cyclothymic patient often becomes euphoric and expansive while the schizoid becomes a true schizophrene[6]. Thus LSD reveals latent

tendencies and its effect may be considered, to a certain degree, as a personality test [2,5,6].

LSD makes it possible for the psychiatrist to study in himself some of the mental symptoms which he is called upon to analyze and treat in his patients. This experience is often instructive [2,6].

LSD 25 and Mescaline: The first workers to carry out research were struck by the analogy between the 'intoxication' produced by LSD and mescaline delirium, although the active doses of these two products are quite different (mescaline at least 0.2 g s c, LSD generally less than 0.0001 g = 100 mg). An analogous relationship has been found when comparing the toxicity of the two substances in cold-blooded animals. The lethal dose of mescaline, in tadpoles, is 100-1000 times greater than that of LSD [8].

Various comparative studies carried out on the same subjects have shown that the mental effects of the two substances are not absolutely identical:

LSD produces, above all else, manic depressive or hebephrenic symptoms [8,11]. In other words, an expansive or foolish euphoria or periodic depression predominates while the hallucinations and depersonalization are fairly slight.

With mescaline, on the other hand, catatonic symptoms [8,11] such as restlessness, stupor, personality disturbances or hallucinations are predominant. LSD and mescaline do not exert the same actions on nervous centers in lower animals. According to Witt [12] these two substances have opposite effects on the behavior of spiders (as determined by web pattern and purposefulness of the insects). An increase in anxiety occurred frequently with mescaline [19].

Mescaline produces fairly important changes in hepatic function demonstrable by the usual laboratory tests, whereas LSD produces a much slighter change which is only made evident by an ultrasensitive test [8].

e. Effects of LSD 25 on psychopathic patients: Generally psychopathic patients are much less sensitive to LSD than normal subjects [2,3,5]. The vegetative and motor effects often appear only after the administration of very high doses, e g two-three mg/Kg. Mental effects are generally less marked and difficult to evaluate in patients who have, in any case, similar symptoms before treatment

and in whom there may be very great spontaneous variations in effect[5]. It is also possible that the negative attitude and the tendency towards dissimulation typical of certain schizophrenics induces them to keep secret their experiences under the effect of LSD[2].

However, in practically every case there are certain behavior changes which are generally accentuated if the dosage of LSD is increased[4].

With regard to psychomotor affects, LSD generally produces, sometimes even in stuporous schizophrenics, an increase in activity and verbal expression which may, especially in manic patients, develop as far as pronounced excitement[4,5,7,7,10].

After very high doses (300-500 mg) De Giacomo[3] observed in five cases out of 12 (3 schizophrenics, 2 oligophrenics) a preliminary phase of excitement followed by typical catatonia, during which the patient's face remained inexpressive while he maintained the same posture for several minutes. This phase lasted up to two hours.

As far as affect is concerned, the previous status can often be enhanced: depressive patients become still more depressed, manic patients still more euphoric[5,27]. In the majority of cases, however, the euphoric effect predominates[2,4,9,27]. Of the 21 schizophrenic patients reported by Hoch[19], seven exhibited euphoria, three alternating euphoria and depression, six depression, and six had a predominantly anxious reaction (total of 22 patients).

The improvement in verbal activity and in affect often facilitates contact with the patient[2,4,7]. Patients become more accessible[4,7,9], and memories hidden in the subconscious may be brought to the surface, particularly in cases of psychoneurosis[7].

The hallucinatory phenomena due to LSD seem to be less frequent and much less varied in psychopathic patients than in normal subjects[2,4,5,7]. The patient's spontaneous hallucinations may be activated[5]. In one case of chronic alcohol intoxication with previous episodes of hallucinosis, 100 mg LSD produced extremely vivid hallucinations resembling the alcoholic delirium that the patient had experienced in the past[26]. In this case, the shock effect produced by this

experience seemed to exert a favorable action on the later evolution. In other cases it is possible to make a clear distinction between the usual hallucinations and those provoked by the drug [2,9].

Depersonalization in psychopathic patients clearly attributable to LSD has only been mentioned in a few cases [5,9]. Catatonic and paranoid features were intensified in some schizophrenic patients [19].

Possibilities of using LSD-25 in psychiatry: The effects described above make it possible to visualize the diagnostic and therapeutic use of LSD.

Personality test: Subjects response to LSD with euphoria, depression, schizoid manifestations, etc depends on their latent tendency. In psychopathic patients LSD enhances the pre-existing conditions and inclines to give a caricature of the patient. The intoxication of LSD thus makes it possible in many cases to determine the deep-seated tendencies of the subject and may be used, in this respect, as a personality test [2,5,6].

Psychoanalysis: In many cases LSD makes the patient more accessible to psychoanalysis by improving contact and facilitating the recall of memories. Busch and Johnson [7] have confirmed that analysis under the influence of LSD is not hampered by speech difficulties, such as frequently occur during barbiturate narco-analysis nor by the confusion which hampers analysis during insulin shock or immediately after electroshock. In patients reacting to LSD with heightened anxiety, contact was rendered more difficult.

Effect of 'shock': The sometimes extremely pronounced mental effects of LSD, particularly in normal individuals, may produce a feeling of hiatus in the life of the patient [6]. In psychopathic patients the action of LSD, at least in the usual dosage, is generally too slight to produce a useful shock effect [5]. As an exception, one case of alcoholic psychosis described by Benedetti [26] must be mentioned, in which the extremely vivid hallucinations produced by the LSD seemed to exert a favorable psychic effect.

Treatment of depression: The euphoric effect of LSD may be of use in the treatment of certain depressive states. However, one should not be too optimistic since, as a general rule, LSD tends rather to reinforce a pre-existing depression. Condrau [5] carried out trial treatment with daily doses of LSD in five depressive

patients. Only in two of them did he observe a slight improvement in affect. This result is not sufficient to be considered a therapeutic success. Savage[24] gave one month's treatment with daily oral doses of 20-100 ug to 11 patients with severe depressive reactions. Two suffering from involutional psychoses made a complete recovery, five schizoid patients with severe depressive reaction became free of depression, and four patients suffering from schizophrenic reaction with depression showed no change or became worse. The improvement obtained with LSD treatment was not greater than that obtained without LSD in comparable cases.

Experimental studies of the pathogenesis of psychosis: Theoretical interest in a substance such as LSD-25 which in infinitesimal doses is capable of reproducing a whole series of symptoms characteristic of endogenic psychoses may be noted. A detailed study of its mechanism of action may enlighten us as to the pathogenesis of psychoses[2,5,8,10]. The possibility of a psychiatrist studying in himself some mental symptoms is also of interest.

9.

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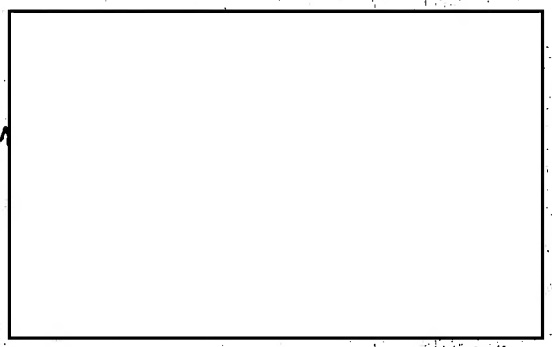

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EXPERIMENTAL SCHIZOPHRENIA-LIKE SYMPTOMS

Max Rinkel, M.D., H. Jackson DeShon, M.D., Robert W. Hyde, M.D., and Harry C. Solomon, M.D., Boston Psychopathic Hospital. Am. J. Psychiat. (1601 Edison Highway, Baltimore 13) 108: 572-8, February 1952.

The authors have studied the effects of d-lysergic acid diethylamide tartrate (L.S.D.) in 15 normal adult volunteers - students, nurses and doctors - in the 19 to 48 age group, and in a group of psychotic subjects (Schizophrenic, depressive, paranoiac). The normal subjects received L.S.D. in doses ranging from 20 to 90 gamma p.o., in most cases one gamma per kg. body weight. The subjects were kept under continuous observation for the first 5 hours by at least one of the authors, under hospital observation the rest of the day, and were seen the next day also. The experiment was conducted in the fasting subject.

Psychotic phenomena and alterations of the autonomic nervous system were observed. The psychotic phenomena were predominantly schizophrenia-like symptoms that were manifested in disturbances of thought and speech, changes in affect and mood, altered perception, production of hallucinations (meager) and delusions, depersonalization and changes in behavior (particularly underactivity associated with lack of spontaneity and initiative). Basic intelligence was not reduced. The authors underline the small amounts of the drug which sufficed to produce the various mental phenomena, with changes similar to those seen in schizophrenic patients. The subjects showed difficulties in thinking, with retardation, blocking, autism. Affect was shallow or clearly blunted. Feelings of indifference and unreality with suspiciousness, hostility and resentment occurred. There were, to a lesser degree, similarities to confusional states, illusional misinterpretations being not infrequent. A few cases showed similarities to manic-depressive states. Delusions of grandiose or persecutory nature were not observed.

Disturbances of the autonomic nervous system included decrease of appetite associated with nausea, complaints of headiness, giddiness, faintness, tremulousness, and shaking; feeling of chilliness or coolness; lump and "funny" feelings in abdomen; constriction in the chest and precordial discomfort; violent cramps and constriction in the abdomen in a patient who just happened to menstruate. Objective symptoms were flushing, sweating, shivering, tachypnoea, salivation, pallor, sighing and urgency of micturition. EEG examinations at the height of the reaction showed but slight changes, principally increased alpha rhythm except in one case where a slowing of about 2 cycles per sec. occurred. Rorschach tests showed abnormalities principally of the schizophrenic or paranoic type. Concrete-abstract thinking tests also, on the whole, showed responses similar to those obtained in schizophrenic patients.